Toward a More Comprehensive Theory of Food Labels

Julie A. Caswell and Daniel I. Padberg

Food labels play important third-party roles in the food marketing system through their impact on product design, advertising, consumer confidence in food quality, and consumer education on diet and health. However, current analysis focuses overwhelmingly on the label's direct use as a point-of-purchase shopping aid, even though such use is limited by consumers' information processing abilities and time. In rewriting label regulations, policy makers should consider the benefits and costs of the broad array of roles labels serve, with evaluation of alternative regimes based on their impacts on consumer behavior and seller strategy.

Key words: consumer information, firm strategy, food labels.

A consensus emerged in the early 1990s on the need for a general overhaul of labeling requirements for food products (see, e.g., U.S. Department of Health and Human Services 1990a, 1990b; National Academy of Sciences 1990, 1991). The central argument of the present article is that, in rewriting label regulations, policy makers should consider the benefits and costs of several important roles that labels play beyond their direct use as a consumer shopping aid. These nonuse and third-party roles place increased emphasis on label design by explicitly recognizing a label's impact on product design, advertising, consumer confidence in food quality, and consumer education on diet and health.

A broadening of the conceptual framework for analyzing food labeling is particularly timely since federal legislation passed in November 1990 requires that new Food and Drug Administration (FDA) regulations on nutritional labeling and health claims be in place during 1992. We pursue this broadening by analyzing the role of information, particularly labeling, in consumer goods markets and the scope of and justifications for current food labeling regulations. We then discuss the limits of food labels as point-of-purchase shopping aids and the important third-party roles of food labels. The article concludes with a framework for weighing the benefits and costs of alternative regulatory regimes.

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Labeling as Consumer Information

The pending update of food labeling regulations will be based on the striking consensus that has emerged in recent years on dietary recommendations aimed at controlling diet-related disease (U.S. Department of Health and Human Services 1988, National Academy of Sciences 1989). However, disagreement exists over the degree and manner in which food labeling should attempt to foster adoption of recommended dietary practices. Even less consensus exists on whether labels should be used to transmit information on issues such as microbial food safety, pesticide residues, use of irradiation, and agricultural practices (e.g., use of biotechnology-based inputs such as bovine somatotropin).

What current discussions have in common is an overwhelming focus on seeing the label primarily, or even exclusively, as an item of direct consumer information (see, e.g., National Academy of Sciences 1991). As such, labels are a part of the information set used by consumers in making product selections. This information set also includes prior experience; media advertising; word-of-mouth information; and general dietary education programs carried out by government, health professionals, or private groups.

Consumer products have been usefully categorized as search, experience, or credence goods

based on the timing and types of quality information available to consumers (Nelson; Darby and Karni). For search goods, the consumer can accurately ascertain the product's quality before purchase. The quality of experience goods can only be judged after purchase and use. With credence goods, quality cannot be accurately judged even after purchase and use and, thus, must be taken on faith. For food products, this categorization is even more useful when it is applied to attributes of goods rather than the goods themselves (Zellner). Thus a tomato has search (e.g., color), experience (e.g., taste), and credence (e.g., levels of micronutrients) attributes.

Information in the form of labels, advertising, word-of-mouth information, and general education programs can contribute to the completeness and accuracy of a consumer's assessment of all three types of attributes. The central regulatory issue regarding consumer information is the degree to which private markets provide full and accurate information to consumers (Beals, Craswell, and Salop; Zellner). Many food markets do not conform well to the conditions of perfect competition. In these markets, there are technically complex products; nutritional and food safety attributes are not detectable by the senses or are obscured by significant processing or ingredient combinations; advertising is important in establishing and maintaining product value; and convenience, packaging, and style are important to the product's quality image. These are typically markets in which quality information is asymmetric and in which competition among sellers is expressed in use of advertising and new product introductions rather than in price rivalry (Connor et al., chapters 3 and 5).

Under certain circumstances, private markets, regardless of market imperfections, may provide reasonably full information without regulation. Grossman models such a case where it is assumed that manufacturers can make *ex post* verifiable claims, that they never lie, and that consumers know manufacturers will make the most favorable claims possible for their products, short of lying. Manufacturers who can make a quality claim will do so and consumers will assume that any firm not making a claim has low quality. Thus consumers can ascertain a product's attributes before purchase by simply examining the producer's claims. This "unfolding process" is attractive, since it places the fewest constraints on manufacturers' practices while still providing full, accurate information. And some support for it is offered by Ippolito and Mathios' recent work on fiber content claims for ready-to-eat cereals.[1] However, the unfolding process requires that consumers have a great deal of information and make specific assumptions, that they know claims are being made, that the claims will be truthful, and that any product not making the claim must be of low quality.

Federal regulators have been reluctant to rely on free market mechanisms to provide consumers with adequate and accurate label information on food products. Federal law (e.g., the Fair Packaging and Labeling Act of 1966[2]) presumes that search economies will be gained by providing consumers with information in standard formats, which an unregulated market is not likely to accomplish. In addition, federal regulation often sets *ex ante* information standards in order to limit the size of the enforcement job in detecting and prosecuting deceptive claims.

Federal regulations require labels to convey information on both objective and subjective food product characteristics.[3] They mandate numerous affirmative disclosures of objective characteristics such as weight or volume, ingredients, and name of manufacturer or distributor. They also dictate the location and size of many information pieces on the label. Other types of objective information have been required under certain circumstances, for example, nutrition labeling where any nutritional claim is made.[4] They have also, from time to time, regulated use of particular terms such as "low sodium." Health claims were in effect prohibited prior to 1984 (Hutt), but were widely allowed throughout the late 1980s. Beyond affirmative disclosure requirements, the FDA also enforces a broad negative mandate that food labels must not be false or misleading in any particular.

A manufacturer's strategic use of product labels to differentiate its products must be done within the confines of federal label regulations. These regulations form a playing field upon which manufacturers maneuver for position vis-à-vis their competitors (Caswell and Johnson). From

[1] In the case of fiber claims for ready-to-eat cereals, manufacturers are presumably constrained from lying by FDA regulation of false label claims.

[2] As this law applies to food products, see 21 CFR Part 1.

[3] The federal regulatory system for food labels is complex, with the U.S. Department of Agriculture (USDA) having authority over meat and poultry products and FDA regulating most other products. A detailed description of this system is not central to the arguments presented here. The interested reader is referred to Kushner et al. and National Academy of Sciences (1990).

[4] Federal legislation passed in 1990 will make nutritional labeling mandatory for most food products.

the manufacturer's viewpoint, limited regulation is desirable for maximum flexibility but too much freedom can be detrimental if it allows numerous false claims that undermine the credibility of manufacturers' communications.

Here we focus on the subset of labeling regulations that is largely aimed at changing (improving) American diets. The subset includes regulation of nutrition labeling, health claims, and warning labels. To this point, labeling has been treated as direct consumer information, with the federal government intervening in the two-party relationship between seller and buyer to remedy information imperfections and failures. Our purpose, however, is to see food labeling policy in a broader context. We proceed by discussing the limits of labels as direct shopping aids and by focusing on the additional third-party roles that labels play. The latter roles have impacts on the food marketing system even without widespread consumer use of labels in making product selections. Some of these impacts occur because a small but active consumer segment uses labels (Padberg), but others can occur even if consumers do not use labels as shopping aids.

The Limits of Labels as Direct Shopping Aids

As shopping aids, food labels add to consumers' information base and help guide buying decisions. They may make markets work more efficiently as competition among firms, in an improved information environment, awards success to products with the best (most preferred) attributes. The label becomes an instrument of consumer sovereignty. Modern behavior and market conditions bring stress and distortion to this idealized picture (Food Marketing Institute). The consumer is often harried and hurried, and grocery shopping logistics limit the potential for significant use of label information in making purchase decisions.

Limits on consumers' information processing abilities in the supermarket stem from several related sources. First, periodic surveys by the Point-of-Purchase Advertising Institute indicate that consumers make as many as two-thirds of final purchase decisions in-store (Food Institute Report). Second, the average consumer makes one major shopping trip per week, spending about an hour in the store (Meloy, McLaughlin, and Kramer; *American Demographics*). Thus the consumer evaluates the over 15,000 products offered by the typical store on complex nutrition, taste, convenience, and price criteria in a limited period of time. Research on grocery shopping behavior indicates that decision-making quality deteriorates when the shopper is under time pressure (Park, Iyer, and Smith). Third, other survey data suggest that consumers dislike grocery shopping (*American Demographics*). These factors limit many consumers' use of labels as shopping aids.

Food labels' impact on purchase decisions is also circumscribed because labels are only one element, and not the most prominent or easy to use one, in a broader set of consumer product information. Advertising is another major source of such information. Eight of the nation's twelve largest advertisers in 1990 were major sellers of food products (*Advertising Age*). The largest spent over $5.6 million per day influencing consumer choice, while the smallest spent almost $2 million per day. It is estimated that a third of food advertising spending now carries some kind of health claim (Hilts). In these markets, the seller influences the buyer and is also often large enough to influence the market as a whole. This is clearly a "second best" situation, where government labeling regulation to make the market conform more narrowly to the perfect information ideal may or may not yield welfare improvements.

Consumers also receive diet and health guidelines from the medical professions, government, and health and consumer advocacy groups. The news media prominently reports these guidelines and recent research results. However, some diet and health information is at a level of technical complexity that is generally inaccessible to consumers. As the controversy over oat bran illustrates, conflicting information may reach the consumer from diverse sources.

In this context, it is not enough to see labels simply as direct consumer information. This is not to detract from food labels' recognized value as such, particularly to consumers (e.g., allergy sufferers, those on special diets, the health-conscious) who frequently use labels for purchase decisions. Nor is it to lament a loss of consumer sovereignty. Many consumer products have complex technical properties. To avoid overload, consumers choose not to be fully "informed" on all their purchases. The point is that the use of labels to effect changes in the American diet faces limits when the mechanism by which this change is to be realized is consumers' direct use of labels as shopping aids. A broader view indicates, however, that there are

additional mechanisms, namely the third-party roles of labels, for pursuing this goal.

Third-Party Roles of Food Labels

In the broader approach, labels are designed for their impact on the whole food marketing system rather than simply as consumer information. An example illustrates the difference. The Center for Science in the Public Interest (CSPI) recently proposed a food label reform that combines a revamped nutrition information panel with a system of stoplights (red, yellow, and green) on the product's principal display panel (Schmidt). The stoplights would give consumers a quick summary of whether the product has a desirable profile of fat, sodium, and fiber content. Suppose the label reformer adopted the stoplight system without the supplementary nutrition information panel. Such a system might serve well the goal of improving the label's usefulness as a shopping aid, since it provides easy-to-understand information. But the stoplights' very summary nature would limit their impact on manufacturers' incentives to produce healthier products. This approach would be comparable to changing the federal government's automobile mileage rating system from exact miles per gallon to "less than 20," "20 to 40," and "40 and over." The competitive reaction would be around the change between categories rather than throughout the entire range (Beals, Craswell, and Salop).

Label reform should relate to the broad array of purposes labels serve rather than exclusively to their consumer point-of-purchase information role. These additional third-party roles are as a significant product-design influence, an advertising franchise, a public surveillance assurance, a public values definition, and a nutrition and food safety education format. We discuss these roles beginning with those we believe to be key.

A Significant Product Design Influence

Once established, labeling regulations significantly influence product formulation and reformulation. Food processors may design a product to use a defined label term, such as "low sodium," or reformulate a product to give better numbers in an important label category, such as fiber. They may also avoid using particular ingredients so they will not have to be listed on the label. For example, many cookie and cracker companies reformulated their products to exclude use of palm oil and lard. This influence can occur even in the absence of widespread consumer label use in making purchase decisions (Putler and Frazao). All that is required is that a population segment or its consumer advocates read labels and use or publicize what they find.

Label disclosure's influence on product design is explicitly recognized by many advocates of increased label information. A case in point is California's Proposition 65,[5] which establishes a duty to warn consumers prior to exposure to certain carcinogens and reproductive toxins (Phipps, Allen, and Caswell). Analysts who question such warnings argue that they are a very cumbersome and ineffective way to inform consumers about potentially risky products or ingredients (Viscusi). They view the warnings primarily as a shopping aid and find them deficient in this role.

Proposition 65's proponents argue that the initiative's success will not rest on the effectiveness of point-of-purchase product warnings as shopping aids. Rather, they anticipate that manufacturers will reformulate products to eliminate ingredients requiring warnings or stop marketing products with such ingredients (Roe, Roberts). Thus Proposition 65 could be a success without a single label warning ever appearing (*Wall Street Journal*). Opponents focusing on the warning as shopping aid may entirely miss this point.

Conscious use of labeling to influence product design requires an awareness of food companies' marketing strategies. Such an approach might be to develop a scoring system that focuses on a limited number of important categories such as "heart healthy," "variety," and "weight control." Within each category, a comparative scoring system could be developed that awards high scores for product attributes that conform to accepted nutritional guidelines. Some attributes (e.g., fat composition) might be elements of more than one category.

As an example, consider the rating system shown in table 1. The "heart healthy" category is subdivided into three dimensions: amount of fat, kind of fat, and sodium level. Scores for each of these dimensions are then weighted to

[5] California's Proposition 65 led to passage of the Safe Drinking Water and Toxic Enforcement Act of 1986. In enforcing this act, California initially adopted FDA standards for carcinogens and reproductive toxins in food, drugs, cosmetics, and medical devices. Therefore, the law has not yet been applied directly to food labeling.

Table 1. A Rating System for the "Heart Healthy" Attributes of Food Products

	Rating score										
	0	10	20	30	40	50	60	70	80	90	100
Percent of calories from fat	100	95	90	80	70	60	50	40	30	20	10
Ratio of unsaturated to total fat	.1	.2	.3	.4	.5	.6	.7	.8	.9	.95	1.0
Sodium, milligrams per serving	700	600	500	450	400	350	300	250	200	150	100

create a composite index. The weighted scores are as follows: amount of fat at 0.45, type of fat at 0.25, and sodium level at 0.30. The product's composite index is

$$\text{HEART HEALTHY} = (\text{Amount of Fat Score})(0.45) + (\text{Type of Fat Score})(0.25) + (\text{Sodium Score})(0.30)$$

In line with consensus nutrition guidelines, foods with a high level of fat, saturated fat, and sodium would have a low index rating. Such a rating system encourages manufacturers to, in effect, "implement the guidelines" or be stuck with a bad score. It also places a much smaller premium on informing the entire population, since improved (from a nutritional standpoint) product offerings may be attained without most consumers having a detailed knowledge of how the scores are constructed and with only a small number using the scores in making purchase decisions.

The construction by experts of such dimensional ratings involves judgments. For example, the consensus target level for percentage of calories from fat has been set at 30%, which in the present index receives a score of only 80. This score is chosen because foods lower than the aggregate target are desirable in order to balance those with a higher percentage of calories from fat. It is also known that experts would have liked to set a target lower than 30%, but felt it to be unrealistic at this time.

Ippolito and Mathios' research in the cereal industry and Putler and Frazao's on fat consumption in the general population suggest that such information could have a powerful impact on product design. The impact could be enhanced by recalibrating the rating systems over time to insure steady but continual improvement in average product offerings. Some may recoil from such a system, believing it has overtones of Big Brother involvement in consumer product choices. Experience with tobacco-related labeling, advertising, and education programs (Ippolito and Ippolito) indicates, however, that use of leverage over consumer choices may be acceptable when it has clear health benefits.

With current information, we cannot fully assess the consequences of such a labeling arrangement, although an assessment framework is described below. If the system could yield improvements in the American diet, its development would appear to be worthwhile. It might also induce advertising information to be set more firmly in the context of accepted nutritional guidelines (see below). These would be powerful results. They are worthy of a considerable investment in theoretical and empirical research.

The scoring approach has serious potential drawbacks. The major drawback is that what is important to health is the whole composition of a person's diet, not the nutritional profile of individual foods that make up the diet. FDA and USDA are concerned that rating systems obscure this fact, miseducating consumers about links between nutrition and health (Lipman 1990a, 1990b). Based on these concerns, FDA and USDA have strongly discouraged private nutritional rating or "seal of approval" programs. For example, in 1989–90 the American Heart Association proposed a seal of approval for products meeting its guidelines for fats, cholesterol, and sodium. Regulators and others were particularly concerned that some products would receive approval seals because they had better profiles than others in their class, even though the class itself was not particularly healthy. For example, margarine might merit a seal when compared to butter but both belong to the class of fats, whose consumption should not be encouraged. These concerns related to label and rating system design would have to be resolved if more active use is to be made of labels to influence product design.

An Advertising Franchise

Food labels and media advertising are closely linked because firms coordinate label and advertising messages to produce a consistent prod-

uct image. However, regulatory jurisdiction over the two message types is split, with the FDA and USDA regulating labels and the Federal Trade Commission (FTC) regulating advertising. In many circumstances, label regulations establish parameters for advertising, in effect creating and limiting the franchise to advertise based on diet and health relationships. For example, nutritional labeling is currently voluntary, except when a product is advertised or labeled with any nutritional claim or information. While modest in its reach, the policy has a straightforward and appealing logic. Where claims are made, the manufacturer must provide nutritional information in a standardized format, allowing consumers to directly evaluate the claim. This system provides a credible verification mechanism where consumers cannot assume that every advertising and labeling claim is truthful.

Health claims are a second area where FDA label policy has had a strong controlling influence over the scope of food advertising. Prior to 1987 (Hutt), health claims were generally illegal, because they triggered the FDA to evaluate the food product under its very stringent drug safety and efficacy standards. Given this stance, few firms ventured to make such claims on labels or, consequently, in their advertising. Health-claims advertising exploded after 1987 when FDA relaxed its label-claims regulation. Thus, while advertising is regulated independently by the FTC, the FDA's label regulations play a key role in setting the parameters for acceptable claims. Through their link to advertising, label regulations affect the entire set of consumer product information. Label reform should seek to manage this third-party role of food label regulations in creating an advertising franchise.

A Public Surveillance Assurance

Consumers may value the presence of comprehensive labeling independently of the value they place on labels as a direct shopping aid. Lenahan et al.'s early study of consumer reaction to the proposed nutritional labeling format fully implemented in 1975 found that many people liked the label's existence even though they did not use it. McCullough and Padberg found a similar pattern in a study of consumer reaction to unit pricing in supermarkets.

In resource economists' language, food labels have option and existence values separate from their direct use value. The option value stems from the availability of the label, should the consumer decide to use it. The existence value can be interpreted as a feeling of consumer assurance that someone is watching over the presentation of food products. This surveillance signals to consumers that they can have confidence in the food supply's quality. While perhaps difficult to measure except through contingent valuation methodology, label regulations' value in terms of generating consumer confidence in the food supply and the reliability of food labels is important.

A Public Values Definition/Forum for Consensus

Regulators' choice of the required information on food labels and the format used signals to consumers, distributors, and manufacturers which of the product's attributes are key and which values make a difference. Any label reform crystallizes, for a significant period of time, a set of judgments on what is important in the areas of nutrition and diet-related disease prevention. The process of making these judgements serves as a forum for building expert consensus (e.g., National Academy of Sciences 1990).

The prominence of this signaling role varies among food products. Traditionally, labels have been least important and least used on staple foods. Frozen vegetables, for example, involve fewer nutritional issues or concerns than more processed and formulated foods. They are not complex products and most consumers understand their food group placement, as stressed by nutrition education. In addition, relatively little advertising is involved in the consumer's efforts to understand this product. By contrast, highly processed or formulated foods, such as snacks or prepared entrées, are less classifiable by staple origin or experience. They are also products that are most heavily advertised. They represent the most convenient way to eat and have become a large part of the American diet. It is here that food labels play a more important signaling role, particularly for diet-conscious consumers.

Parallels can be drawn to other consumer products. Label requirements for automobiles and cigarettes contain objective measurements of attributes seen to be important to the public, such as price information and miles per gallon for cars and nicotine and tar for cigarettes (Ippolito and Ippolito). In revamping food labels, crucial decisions on relative emphasis must be made with an eye to the signals transmitted to consumers

and industry. This is label reform's heart and is where consensus must be found before more technical issues, such as use of pie versus bar graphs, are tackled. The regulator must make this decision knowing that it will have impacts on label format, product formulation, advertising, and consumer's image of particular products.

A Nutrition and Food Safety Education Format

The traditional nutrition education format has been to classify foods into four groups based largely on animal or plant origin. Staple foods are relatively easy for the consumer to place in this system. It works less well for complex products such as formulated or fortified foods, combination products such as frozen dinners, and many snack items. Advertising is heaviest for these products.

As complex foods become a larger part of the American diet, the traditional nutrition education format (and definition of nutritional values) becomes obsolete. The 1975 nutritional label format provided the beginning of a definition of nutritional values independent of animal or plant origin. Recent guidelines go much further in this direction (National Academy of Sciences 1989, U.S. Department of Health and Human Services 1988). New label regulations need to recognize labels' third-party role in reenforcing other forms of nutrition education at the consumer level (National Academy of Sciences 1990, 1991). It will be a tremendous advantage for label format to be designed with an explicit view toward use in educational programs. Product labels which fall short of this standard exact a cost in educational program effectiveness and consumer confusion. While our argument focuses on nutrition education, it applies as well to food safety education. Labels may soon play a larger role in informing consumers about potential product risks and proper handling methods. Here, too, we should expect considerable synergism between labels and other educational programs.

A Proposed Framework for Evaluating Alternative Labeling Regimes

The existing conceptual approach to food product labels evaluates their impact in terms of a role as consumer "point-of-purchase" information. We argue that food labels have additional third-party roles growing out of the information dynamics of modern food markets. A required disclosure may change the attitude of the consumer or consumer advocate (even if consumers do not read or understand it) and may change the sellers' strategy. We envision the development and implementation of policy that recognizes and exploits all the roles labels play.

At this point, we suggest the development and empirical testing of a more comprehensive theory of food labeling. This research has immediate application in a benefit/cost framework for evaluating alternative labeling regulations. The appropriate approach is to compare the social benefits and costs of alternative regimes with an additional focus on distributional issues. Distributional impacts are particularly important in view of recent research suggesting that some demographic segments are disproportionately reached by diet and health information (Ippolito and Mathios, Putler and Frazao).

We argue that potential sources of benefits from nutritional and health claim label regulation have been too narrowly conceived. The benefits will be largely manifested in welfare increases because of improved health status (reductions in mortality or morbidity). The theoretically preferred methodology for valuing such improvements is to measure consumer willingness-to-pay for the associated benefits. Alternative methodologies that value costs of illness, loss of productivity, and other costs of impaired health status offer useful but less comprehensive benefit measures (Landefeld and Seskin, Roberts and Foegeding).

Benefits valuation for labeling regulations is complex: diet is only one determinant of health status, nutritional attributes are but one factor in food choice, and labels are only one information source on food products' nutritional attributes. Despite these complexities, alternative nutritional and health claim regulatory regimes should be evaluated according to their impact on consumers' decisions and firms' incentives to design and merchandise products with different health profiles.

In prior studies, costs of labeling regulations may also have been too narrowly conceived, primarily as compliance costs. Recent work by French and Neighbors suggests that such compliance costs, while sometimes large, can typically be absorbed in the normal label-change cycle if the compliance period is sufficiently long. No empirical estimates are available on the broader economic costs society may incur from loss of business flexibility, or potential loss of

consumer product choice associated with more extensive labeling regulation. Comprehensive evaluation of alternative labeling regimes requires quantifying these costs.

While we would like to offer better evidence on the importance of food labels' third-party roles, such evidence is simply not yet available. The framework described here offers an approach for developing that evidence. In the meantime, it is important that these roles be recognized both in forming the research agenda and in the significant episode of policy formulation now underway.

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